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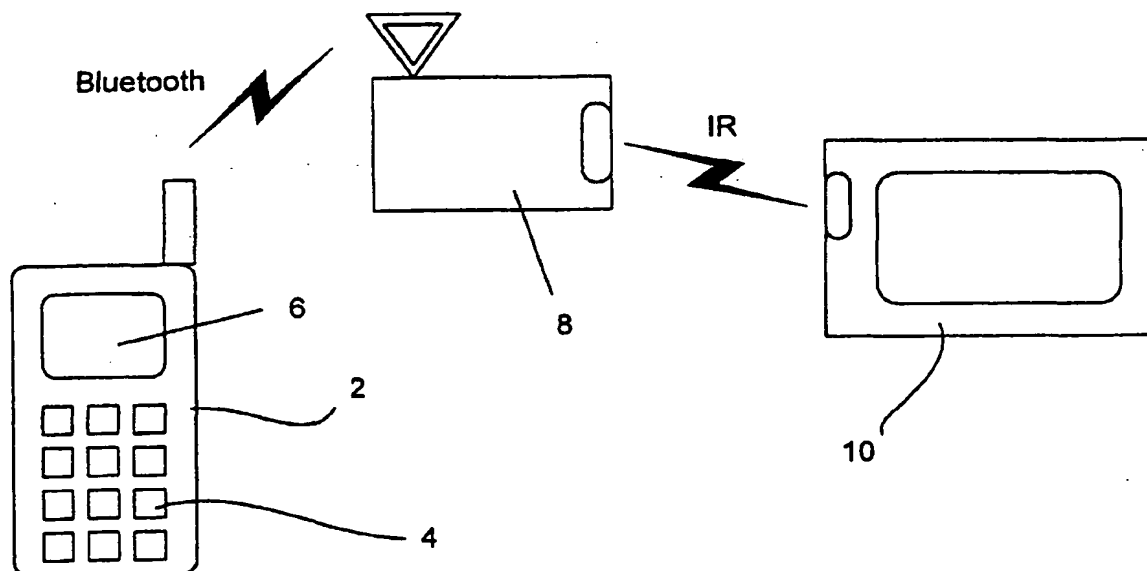
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ning of each regular issue of the PCT Gazette.

(54) Title: **REMOTE CONTROL INTERFACE FOR CONVERTING RADIO REMOTE CONTROL SIGNALS INTO INFRARED
REMOTE CONTROL SIGNALS**



(57) Abstract: A remote control interface has a Bluetooth transceiver (11) for receiving commands from a Bluetooth enabled device such as a mobile phone (2), an infra-red transmitter (12), and a processor (14) for converting received commands from the phone into transmitted infra-red codes for controlling a TV or the like (10).

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REMOTE CONTROL INTERFACE FOR CONVERTING RADIO REMOTE CONTROL SIGNALS INTO
INFRARED REMOTE CONTROL SIGNALS

Field of the Invention

The present invention relates to remote control devices, and in particular to a
5 device for providing an interface between Bluetooth enabled devices and infra-red
controlled devices.

Background

At present, many domestic entertainment devices, such as TV, Hi-fi, VCR and DVD
players are controlled remotely via an infra-red link. Such devices are supplied with
10 a dedicated remote control, but programmable remote controls to enable control of
several devices from one remote control have been available for many years.

Mobile phones, and some personal digital assistants, palm computers and the like
are sufficiently versatile to be used as remote control devices. The range of keys,
displays and processors typically provided allow for a wide range of commands to
15 be programmed into the phone etc. and accessed rapidly by the user. However,
even when such phones, PDAs, etc. are provided with an infra-red transmitter, its
range is too short and power too low for use with domestic devices. Generally the
intention is to provide for data transfer between closely adjacent devices. Extender
devices which allow a programmable remote control to be used throughout a house,
20 by utilising a radio frequency link, are known. The remote control simultaneously
transmits IR signals and RF signals which correspond to the IR signals. The remote
control is programmed to issue the required IR command codes in the usual way for
controlling a device directly or via a command centre. The command centre is
positioned near the entertainment device. It receives the RF signals and transmits
25 the corresponding IR signal to the entertainment device. Hence the remote control
must have both IR and RF transmitters and encoders, and the remote control itself
is programmed by the user to issue the required IR instruction codes.

- With the advent of the Bluetooth technology or protocol, mobile phones, PDAs etc. are being equipped with Bluetooth transceivers (Bluetooth is a short range, low power, spread spectrum, data transfer system, utilising two way radio communication on the 'unlicensed' 2.4 GHz waveband). Bluetooth has been
- 5 developed to facilitate communication between Bluetooth enabled devices, that is devices equipped with a Bluetooth transceiver, in the domestic or small office environment. The signal strength is intended to reach only 30 metres, effectively confining the signal to a single room, although the communication protocol minimises the risk of conflicts with other nearby 'piconets'.
- 10 In principle, Bluetooth transceivers could be installed in domestic devices such as TVs. However, such devices are renewed less frequently by users than a typical mobile phone is, for example.

Summary of the Invention

- The present invention provides a remote control interface comprising a radio
- 15 frequency receiver and an infra-red transmitter, and control means for causing the infra-red transmitter to issue pre-determined commands on receipt of a pre-determined radio frequency communication.

Very preferably, the radio frequency receiver is a transceiver utilising the Bluetooth system, Home RF, or a similar radio frequency data transfer system.

- 20 The remote control interface may be provided on a housing which clips on a Bluetooth enabled mobile phone, PDA or the like. It may be provided as a stand alone unit which is positioned within 'sight' of the device, such as the TV and Hi-fi to be controlled, or it may be mounted on the TV etc. Preferably a single remote control interface is provided and is programmable to control a range of devices, but
- 25 an interface dedicated, and pre-programmed with infra-red commands for particular devices may also be utilised.

The control means of the interface may be programmed, from the mobile phone or other Bluetooth enabled device, avoiding the need for programming buttons or

switches on the interface device. Thus, it is possible to provide an extremely versatile remote control interface at low cost. The interface device itself will not ordinarily be a remote control.

5 To assist in programming, the interface device may be configured to receive infra-red commands or messages from other 'standard' remote control devices. The interface may also receive information from the device being controlled, for example where there is two way communication between the device and its standard remote control.

10 Received infra-red messages may be used to update information held by the mobile phone or other Bluetooth enabled device by transmission from the Bluetooth transceiver in the remote control interface.

Thus, the interface device detects that a command has been issued by the standard remote control, to change TV channel for example, and this information is then transmitted to the mobile phone where it can be stored, and the information used as
15 appropriate. The interface device may transmit the information immediately, particularly if a Bluetooth enabled device is known to be nearby. It may also store the information to transmit at a later time, for example when a device, or another device, enters the room.

Brief Description of the Drawings

20 The invention will be further described by way of example, with reference to the accompanying drawings, in which:

Figure 1 shows a domestic system utilising a remote control interface in accordance with the invention;

Figure 2 is a schematic system diagram for the interface of Figure 1; and

25 Figure 3 is a flow diagram illustrating the operation of the system according to the invention.

Detailed Description

Referring to Figure 1, a mobile phone 2 has a keypad 4 and display 6. Mobile phone 2 also has a Bluetooth transceiver for transmission and receipt of commands using the Bluetooth communication channel and protocol.

5 The user issues commands by inputting instructions using the keypad 4, and also by use of an on-screen command menu shown on display 6. The issued commands are received by a remote control interface 8 which also has a Bluetooth transceiver. The interface 8 in turn translates the received command into an appropriate infra-red command which is transmitted to a TV 10.

10 Referring to Figure 2, the remote control interface 8 has a Bluetooth transceiver 11, a high power, wide area infra-red transceiver 12 and a CPU 14 for translating received 'Bluetooth commands' into transmitted 'infra-red commands' and vice versa. A non-volatile RAM 18 stores command codes and sequences which may be programmed into the device during manufacture (for example IR codes for a range
15 of TVs, Bluetooth transmitted codes corresponding to particular key strokes), or by the user. Thus the user will configure control means in the interface to issue particular IR command codes to control the TV channel, volume, etc. on receipt of a particular command input via the mobile telephone keypad and transmitted to the interface by the Bluetooth transceiver. The interface may learn the required IR
20 code from the standard remote control by the user activating the relevant command button on the remote and pointing it at the IR receiver in the interface.

The interface 8 may be powered by a mains supply, batteries or solar cells, for example.

25 The Bluetooth enabled device may carry program listings which can be displayed on the phone's display. In the case of a mobile phone these may be downloaded automatically from the communication network. Other information may be programmed in by the user or by a direct infra-red link from an entertainment device, for example the listing for discs stored in a disc player.

A typical user sequence utilising an infra-red transceiver in the interface may be as follows:

1. Mary tunes the TV 10 to channel 3 using her dedicated remote control. She is the only person currently in the room (step s1).
- 5 2. The TV senses the IR command from the dedicated remote control and changes channel (step s2). Meanwhile, the remote control interface 8 also senses the IR command, interprets it, and records the information in memory (step s3). There being no appropriate Bluetooth units in range, nothing else happens at this point.
- 10 3. John enters the room, with his Bluetooth enabled phone 2 in his pocket. The two devices 2, 8 form a Bluetooth piconet in the usual way (step s4), and then software running on the phone interrogates the module for information (step s5). The module 8 receives the information request (step s6) and in turn, passes on the 'TV:tune to channel 3' command record, via Bluetooth (step s7).
- 15 4. On receiving this information (step s8), the phone 2 retrieves (e.g.) an electronic programme guide, moves the 'current position' within the guide to the programme listings for channel 3, and displays it (step s9).
5. John takes the phone out of his pocket, and is able immediately to check the listings information (e.g.) for the current channel, without having to enter any
20 further information.
6. Mary leaves the room, John browses the listings (step s10) and decides to view a program on channel 4 instead. He issues the command on his phone (via e.g. a WML script call executed by the electronic programme guide WML W AP stack).
- 25 7. The command 'TV:tune to channel 4' is sent via Bluetooth from the phone 2 to the module 8 (step s11).

8. The module 8 receives the command, and stores it in memory (step s12). It also emits the appropriate IR sequence to cause the TV 10 to perform the tuning operation (step s13).

5 9. The TV 10 receives the IR signal and retunes (step s14).

This "command eavesdropping" mode would also be useful for applications such as audience profiling (i.e., ratings covering what channels audiences actually watch). In such a mode, the device could monitor the Bluetooth IDs of the various phones in the room, as a guide to the current audience in the room (assuming people tend to
10 keep their phones with them, and switched on, most of the time).

Although the embodiment has been described particularly with reference to the Bluetooth communication system, other standards such as Home RF could be used.

Claims

1. A remote control interface comprising a radio frequency receiver, an infra-red transmitter, and control means which are configurable by the user for causing the infra-red transmitter to transmit pre-determined or pre-programmed command signals on receipt of a predetermined or pre-programmed radio command signal by the radio frequency receiver.
2. A remote control interface as claimed in claim 1, wherein the radio frequency receiver is also a transmitter.
3. A remote control interface as claimed in claim 2, wherein the radio frequency transceiver utilises the Bluetooth transmission/reception protocol.
4. A remote control interface as claimed in claim 2, wherein the radio frequency transmission utilises the Home RF standard.
5. A remote control interface according to any one of the preceding claims, wherein the control means is configurable from a remote radio frequency transmitter.
6. A remote control interface as claimed in any one of the preceding claims, including an infra-red receiver.
7. A remote control interface according to claim 6, wherein the control means is configurable from a remote infra-red transmitter.
8. A remote control interface according to claim 2, 3 or 4, further comprising an infra-red receiver, the interface being arranged to receive infra-red signals for transmission, via the radio frequency transmitter, to a remote radio frequency receiver.

9. In combination, a remote control interface as defined in claim 3, and a user held Bluetooth enabled device.

10. The combination of claim 9, where the device is a mobile phone.

11. The combination of claim 9 or 10, wherein the device includes a display and
5 a keypad.

12. An adapter for attachment to a Bluetooth enabled device, the attachment including a Bluetooth transceiver and an infra-red transmitter.

13. A remote control system for a domestic entertainment device comprising a
hand held control having a keypad, a radio frequency transmitter, and control means
10 for transmitting RF codes on actuation of certain keys or combinations of keys of
the keypad, and an interface device having a receiver for receiving the RF codes, an
infra red transmitter for transmitting IR codes, and control means configurable to
transmit predetermined IR codes in response to the reception of predetermined RF
codes.

14. A remote control system as claimed in claim 13, wherein the interface device
15 is not configured to be manually operated as a remote control.

15. A remote control interface comprising a radio frequency transmitter, an
infra-red receiver and control means configured to cause the radio frequency
transmitter to transmit information received from a remote infra-red transmitter to
20 a remote radio frequency receiver.

16. A remote control interface according to claim 15, further comprising means
for storing the received information until a remote radio frequency receiver is
available.

17. A remote control interface according to claim 15 or 16, wherein the radio
25 frequency transmitter and the radio frequency receiver operate according to the
Bluetooth protocol.

18. A remote control interface according to any one of claims 15 to 17, wherein the control means is programmable from a remote infra-red transmitter.

19. A method of controlling a device which is configured to receive control information from an infra-red transmitter, comprising the steps of:

5 receiving radio frequency control information at a remote control interface;
converting the radio frequency control information to infra-red control information; and

transmitting the infra-red control information from the control interface to the device.

10 20. A method according to claim 19, further comprising the steps of:

receiving infra-red control information at the remote control interface;
converting the infra-red control information to radio frequency control information; and

15 transmitting the radio frequency control information to a radio frequency enabled device.

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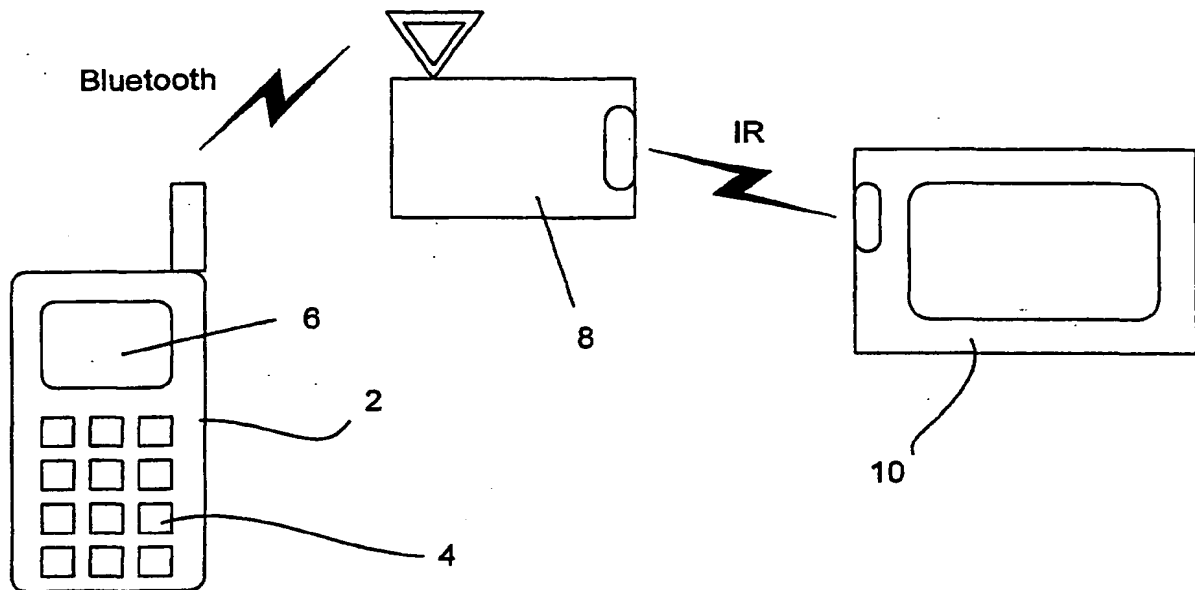


Figure 1

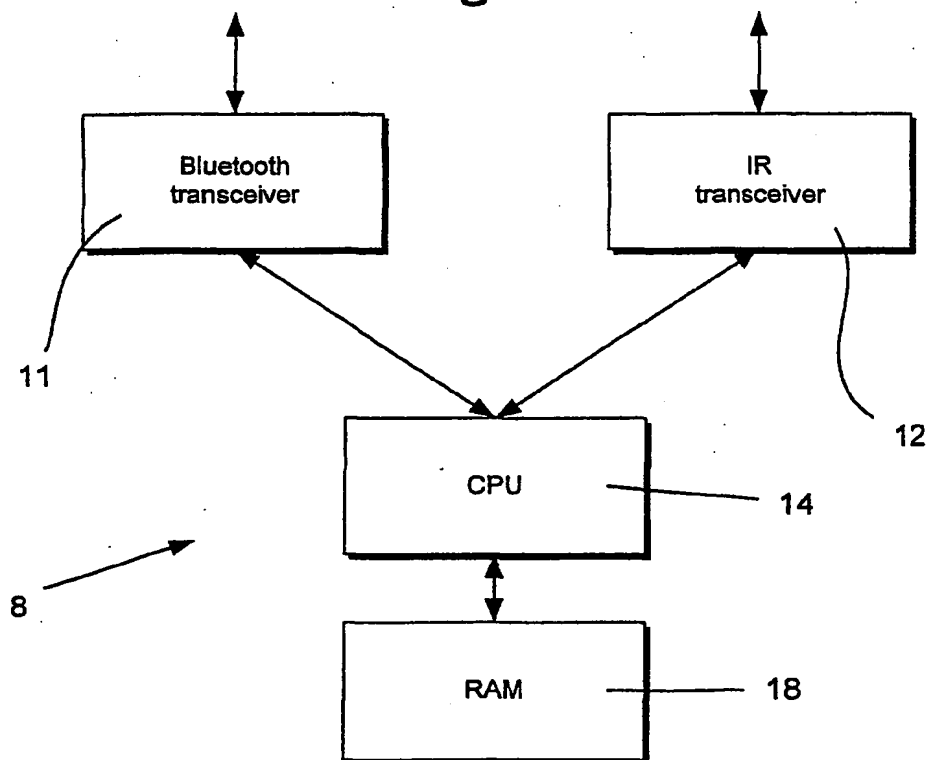
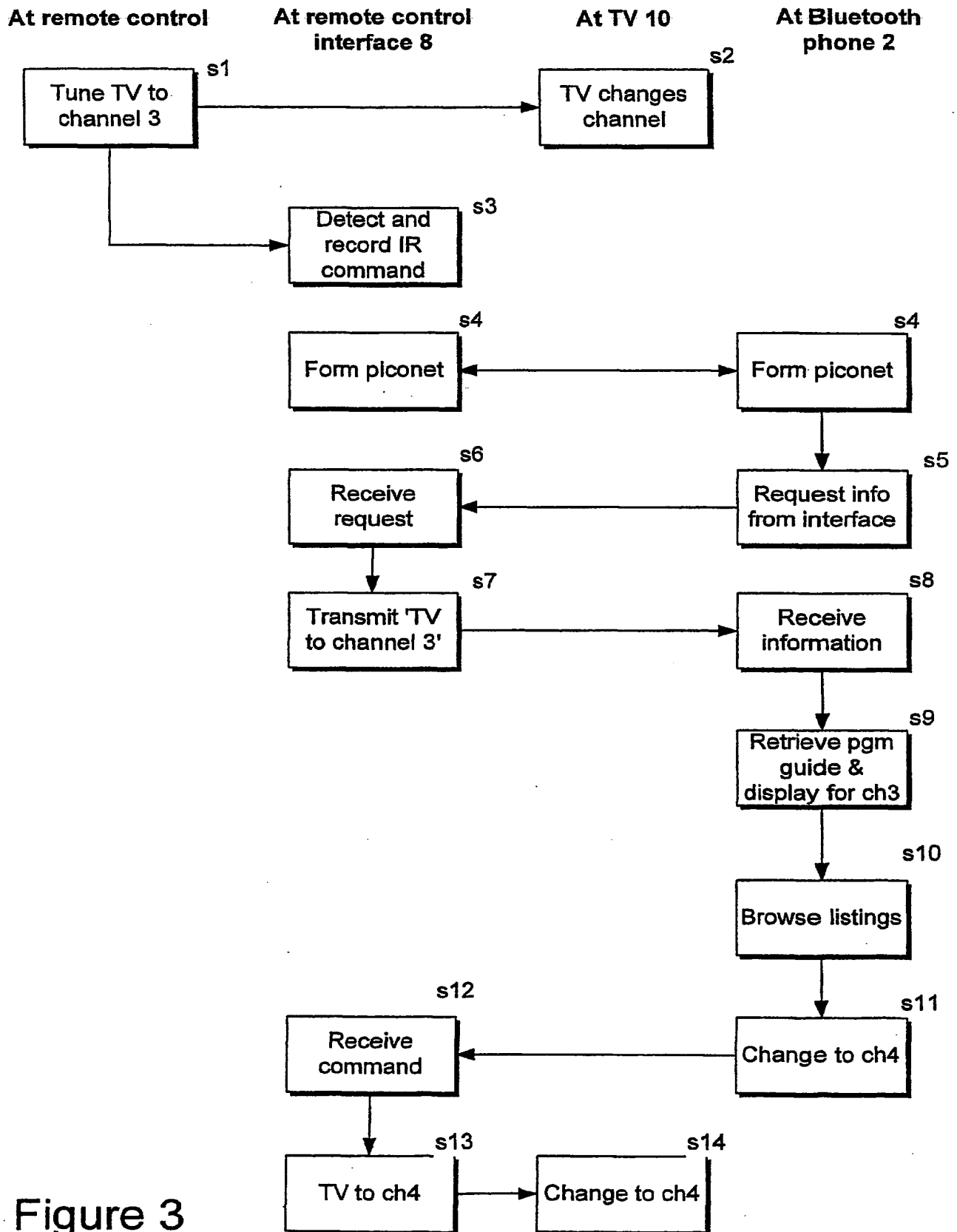


Figure 2

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G08C23/04 G08C17/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G08C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 963 624 A (POPE STEVEN M) 5 October 1999 (1999-10-05)	1,2,13, 14,19
Y	column 2, line 45 -column 3, line 67	3,9-12
A	column 4, line 52 -column 5, line 14	15,18
Y	WO 99 41876 A (ERICSSON TELEFON AB L M) 19 August 1999 (1999-08-19) page 10, line 6 -page 12, line 2	3,9-12

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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WO 9941876	A	19-08-1999	AU 2650199 A	30-08-1999
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